



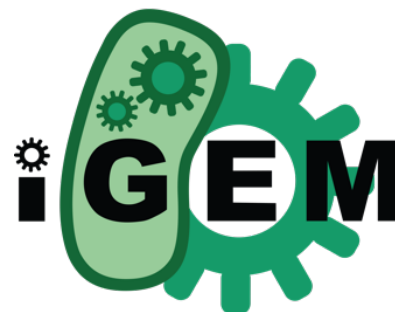
UNIVERSITY OF  
OXFORD

# Oxford iGEM 2016

Multidisciplinary team of 1<sup>st</sup> and 2<sup>nd</sup> year students at the University of Oxford

*Probiotic pill introducing bacterial copper binding in the gut - as a treatment for Wilson's disease.*

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## What is iGEM?

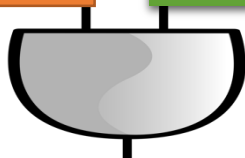
iGEM is about exploring the power of synthetic biology to solve a big world problem. This is an international competition run by MIT with over 250 teams entering every year. Our team at Oxford has 11 students - including biochemists, engineers and medics - who will work together to design genetic circuits. We will then spend the summer genetically engineering bacteria in the lab to make our idea a reality. The project gives 1<sup>st</sup> and 2<sup>nd</sup> year Oxford students from all subjects the opportunity to apply their skillset to a high impact project that they have complete control over - from research to designing, before lab work in the Department of Biochemistry, Oxford. Our team will be flying to MIT in October 2016 to present our project at the annual iGEM conference, where we will also meet other teams from around the world.

### Copper sensitivity:

After a meal the copper levels in the gut increase, and this is detected by our bacteria

### Temperature sensitivity:

Our bacteria only binds copper at body temperature (37°) as a safety mechanism



### Copper binder:

ONLY when copper and temperature requirements are fulfilled, our bacteria produces a more powerful form of the copper binders used as current treatment

Probiotic pill containing engineered bacteria consumed

Bacteria establish a safe and persistent population in the gut

Long-term cure: bacteria bind copper and reduce absorption

## The problem: Wilson's Disease

Wilson's disease is a genetic disorder which causes the body to accumulate too much copper. This causes liver failure and brain damage in affected patients. Wilson's is a rare disease because it affects about 1 in 30,000 people (250k worldwide). The drugs currently used to treat Wilson's are copper-binders, but there are two major problems with these:

- 1) **Toxicity:** these drugs have severe side effects, and treatment course often has to stop
- 2) **Administration:** tablets need to be taken before every meal for the rest of the patient's life

## Our solution: probiotic bacteria

A growing field in medicine is 'probiotic pills' - using micro-organisms to provide health benefits. At Oxford iGEM we are exploring the potential to introduce a special bacterial population in the gut - which have been genetically modified to bind copper. This would reduce the amount of copper that can be absorbed into the blood, and therefore prevent its accumulation in the blood. Compared to current drugs, this solution offers:

- 1) **Lifelong cure:** bacteria persist in the gut and excrete the copper they bind to as they are turned over
- 2) **Fewer side-effects:** copper binding occurs in the bacteria and is isolated from the body

## Sponsorship

Our project is made possible by our generous sponsors who support us in realising our goal. Sponsorship is an easy and effective way to promote your business to a large body of students both in the UK and around the world. Just get in contact with us at [oxfordigem@bioch.ox.ac.uk](mailto:oxfordigem@bioch.ox.ac.uk).

### Benefits of sponsoring us include:

- ✓ Our team Wiki on the official iGEM website
- ✓ Your logo on our iGEM jumpers worn at all events
- ✓ Final presentation in MIT, Boston
- ✓ Promotional material
- ✓ Social media advertising through our Twitter